

Pollution Prevention -- Good Housekeeping Techniques

Pollution Prevention (P2) involves the reduction of toxics use and preventing, reducing, and recycling hazardous wastes and emissions.

Simple and Effective

P2 does not have to be expensive or “high-tech.” Companies can often make major strides in reducing waste by implementing simple improvements.

Good housekeeping practices are things which can be done to maintain cleanliness and prevent messes, spills, or accidents. Good operating practices include other simple steps, such as preventive maintenance, that can minimize waste generation.

Objectives

The objective of good housekeeping and operating practices is to minimize material losses and prevent unnecessary hazardous waste generation through routine procedures.

Good housekeeping and operating practices often have great waste reduction impact, and involve little capital expenditure or effort to implement.

Consider including them as part of the overall operating plan at your facility, and implementing them first in order to get the most out of your waste reduction program.

All industries can benefit from these pollution prevention practices. These suggestions can heighten awareness of other opportunities available to reduce waste generation and can also be a starting point for your own ideas.

P2 Options

The following pages identify good housekeeping and operating practices which may be implemented at your facility, such as:

PREVENTIVE MAINTENANCE
INVENTORY CONTROL
TRAINING & SUPERVISION
PURCHASING
RAW MATERIALS USE & HANDLING
STORAGE AREAS
OPTIMIZING OPERATIONS & PROCESSES
PROPER LABELING
RECEIVING & DELIVERY
HAZARDOUS MATERIALS &
WASTESTREAM SEGREGATION

Preventative Maintenance

A strict preventive maintenance program can reduce equipment breakdown, inefficient operations, leakage, and resulting clean-up.

Clean-Up

Curtail water use for spill clean-up and use dry clean-up methods to minimize clean-up wastes:

Clean-up small spills with rags (do not saturate, keep in a covered container) and send to an industrial laundry service (try to find one which recycles its wastewater.)

Contain and recover fluids for reuse or recycling (squeeze from mop, wring from rags or absorbent mats, use a wet / dry vacuum.)

Sweep floor using a dry absorbent material; reuse absorbents until spent, then dispose of it properly.

Container Integrity

Periodically test container integrity; look for leaks.

Monitor Discharges

Monitor and test all discharges from internal heating and cooling coils quarterly.

Use Flange guards, double seals; pumps with double mechanical seals; bellow-sealed valves; or canned (seal-less) pumps.

Neatness Counts

Keep work areas clean and orderly.

Routine Inspections

Routinely inspect and address all potential sources of leaks and spills. Check:

Process and storage tanks, including all equipment attached to them.

Pipes, valves, and hoses. (Look for leaks at seams, pump seals, and flange gaskets.)

Material, waste, and empty container storage areas.

Inventory and other storage areas for improperly labeled containers and old / expired shelf-life materials.

Equipment Inspection

Install, and periodically inspect spill and leak control equipment:

Splash guards, drip boards, and spill basins on dikes.

Overflow control devices, alarms, rupture disks, relief valves, leak detection systems.

Piping Construction

Maximize use of welded piping construction instead of flanged pipe joints.

Good Purchasing Procedures

Good purchasing procedures can identify and reduce potential waste before it enters your business.

Container Review

Consider your intended use and standard operating practices. Purchase materials in the size and type of container which will minimize material losses and costs:

Buy in smaller containers if transfer from large to smaller containers is generally required before use. (There will be less potential for spills, material evaporation, expiration of unused materials, and will prevent contamination from unused material returned to the original container.)

Buy in pre-weighed packages to reduce handling losses (if applicable.)

Buy materials used often in larger containers. (Buying in bulk can reduce the number of containers requiring disposal, especially when refillable containers are used.)

Buy containers that are wider than tall. (They have less "cling," resulting in greater material use and less container residue.)

Buy containers which will minimize disposal problems (e.g. fillable pressurized spray cans in place of single use aerosol spray cans.)

Evaluate Facility Design

Consider waste reduction when planning expansions, and evaluate potential building purchases / leases to determine whether the building design is amenable to waste reduction.

Make sure that:

Shop equipment can be laid out in an efficient manner.

Hazardous materials storage areas exist or can be easily installed.

Space and utilities are available for proper recycling, reuse, and treatment needs, etc.

There are large access doors, wide walkways, and other amenities which can increase ease and safety of operations.

Chemical Samples

Establish a policy for accepting samples so they do not accumulate and add to the waste disposal

load:

Designate one person to be responsible for acceptance of chemical samples.

Test on a bench scale basis to reduce the volume of waste needing disposal.

Require that suppliers accept back the unused samples they provide.

Material Review

Evaluate the materials used by your business. Look for less toxic or non-toxic substitutes, and purchase:

The least toxic and least costly to handle products that work.

Higher-purity raw materials.

Non-corrosive raw materials.

Equipment Evaluation

Prior to purchase, ensure that new equipment:

Will generate the least amount of hazardous waste possible.

Can be easily maintained. (Preventive maintenance can save 3-4 times the equipment cost by reducing breakdowns and malfunctions.)

Complies with all applicable environmental and safety standards. (Check with the regulating agencies. Use suppliers who have knowledge and experience in these areas.)

Centralized Purchasing

Channel all material purchases through a central person or department to:

Eliminate any unnecessary purchases.

Ensure that waste reduction purchasing policies are followed.

Material Safety Data Sheets

Make certain that distributors supply you with MSDSs for all purchased hazardous materials in order to:

Know material hazards, proper handling, safety precautions, and emergency response procedures.

Comply with worker and community Right-to-Know laws.

Help you to determine the nature of your wastes.

Inventory Control

Inventory control procedures are important to reduce management costs and potential hazards associated with excess, off-spec, and expired materials.

Track Materials

Effectively track the shelf-life of time sensitive materials and use the oldest stock first ("first-in, first-out"):

Label, date, and inspect new materials as they are received.

Keep records of dates of receipt and usage to help reduce overstock and material degradation.

Inventory raw materials at least once per year.

Consider computerizing your tracking system.

Minimize Inventory

Buy and stock only what you need. (The costs associated with hazard risks, hazardous materials fees, and disposal of excess or expired stock may outweigh the costs of waiting for resupply shipments.):

Carefully consider large purchases (especially if only to get a discount.)

Time deliveries to coincide with production needs ("just-in-time" system.)

Storage Conditions

Maintain proper temperature, humidity, etc. to reduce material degradation.

Set Inventory Limits

Set according to emergency response capacity. (How large an inventory can your spill / emergency response equipment and personnel handle? The more inventory of hazardous materials, the greater the chance for overcrowding storage areas and resulting safety problems such as spills, fires, and exposures.)

Reduce the Number of Similar Products

If you use several types of solvents, could fewer do the job? Reducing the number of solvents would improve inventory control and enhance recycling opportunities.

Look for substitutes with longer shelf lives.

Use waste exchanges for overstock, off-spec, or expired materials.

Work with vendors to accept back excess, off-spec, or expired materials.

Training and Supervision

Good employee development and training programs promote waste reduction and the efficient use and handling of hazardous raw materials, and minimize worker exposures and accidents.

Training Programs

Improve operator training, supervisor-employee communications, and quality control.

Train employees in safe handling of hazardous materials, proper waste management, and emergency / spill response.

Provide additional training in pollution prevention practices; increase employee awareness of waste management costs to encourage consistent use of these practices.

Place signs with operating directions on specific equipment.

Written Procedures

Prepare operating manuals or detailed instructions to increase employee safety and efficiency. Include:

Detailed descriptions of normal operating practices.

Listing of process operating conditions and controls.

Listing of effluent / emission discharge levels.

Identification of safety hazards and how to address them.

Outline of emergency procedures.

Description of overall process and role of each individual position.

Materials Use and Handling

More efficient use of raw materials will reduce losses and unnecessary waste generation.

Ensure that employees

Use supplies only for their intended purpose.

Use only the amount necessary.

Handling Procedures

Provide transfer methods which prevent spills and product quality problems:

Pipelines for intermediate transfer.

Gravity spigot or pump to dispense bulk liquid materials.

A spout and funnel for transferring liquids to different containers.

Proper connection / disconnection of hoses and lines.

Access Control

Control access to hazardous raw materials:

Designate central personnel to distribute materials.

Limit access to employees trained in hazardous materials handling and who understand the importance of first-in first-out policy.

Record Keeping

Keep records of when and why larger spills occurred in order to identify spill prevention opportunities and to document related costs.

Raw Materials

Keep frequently used raw materials near the area of use to minimize spills / accidents during transport.

Storage Areas

Well-designed areas for storage of hazardous materials and wastes can minimize and contain spills, and provide for easy inspection of containers.

Container Stacking

Stack containers no higher than recommended by the manufacturer and in a way which minimizes the potential for tipping, tearing, puncture, or breakage.

Don't stack equipment against containers.

Raise drums off the floor to prevent corrosion from concrete "sweating."

Electrical Circuitry

Insulate electrical circuitry and check frequently for corrosion and potential sparking.

Secondary Containment

Provide secondary containment and maintain proper distance between different materials.

Spill Containment

Install sloped concrete floors and curbs or berms for spill containment.

Raw Materials Access

Provide access to front and back of shelving so new materials can be placed behind older stock.

Storage Areas

Keep raw materials and waste storage area aisles clear of obstructions, clean, and well lit.

Allow elbow room to access all containers easily and to minimize spills.

Arrange containers to allow space to inspect for corrosion and leaks.

Maintain clear, even surfaces on pathways used by workers or equipment.

Cover outdoor storage areas to prevent contamination of storm water.

Secure storage areas to minimize liability and hazards of intrusion or dumping.

Container Quality

Use high quality, resealable containers to prevent spills, evaporative losses, and contamination; and keep the lids/seals closed when not in use.

Optimizing Operations and Procedures

Attention to maintenance and operation of process equipment can reduce the frequency of cleanings, prevent production of off-spec products, and excess spent process materials.

Scheduling

Schedule facility operations in order to minimize the number of cleanings required ("procedural scheduling"):

Schedule jobs in batches and maximize the batch size.

Printing / coating / mixing operations, etc., begin with lighter color and proceed to darker ones; do runs of like colors back-to-back, ("gang-up" jobs.)

Avoid shifting production schedules for rush orders. (May increase your waste generation by increasing cleaning requirements or causing material scheduled for production to be wasted.)

Cleaning Methods

Use efficient washing and rinsing methods:

Eliminate the use of filter aids.

Use countercurrent and reactive rinsing methods.

Recycle spent wash water.

Optimize Operations

Optimize raw materials use and minimize residues (which become cleaning wastes):

Allow adequate drainage of parts and equipment.

Use mechanical or manual wall wipers on tanks.

Keep temperatures at optimum levels (note boiling point on Material Safety Data Sheet to minimize evaporative losses.)

Use nonstick surfaces and minimize wetted surface area. (Cylindrical tanks with height and diameter about equal are the most efficient.)

Use better process-monitoring systems.

Check mechanical agitators to ensure proper operation and mixing.

Routinely calibrate / adjust all automatic process control devices to increase productivity and prevent loss.

Adjust input material feed flow and purity controls.

Proper Labeling

Proper labeling is extremely important to prevent accidents and extra disposal costs.

Container Labeling

Ensure proper labeling of all incoming materials as they are received. (Include product name, weight, concentration, lot number, date, hazard class, and any other information useful in tracking material location, quality, age, or use.)

Label all portable "squeeze" bottles.

Always label hazardous waste at its point of generation where it can still be easily identified. (Testing later to determine the contents is expensive.)

Label all stationary tanks, pipelines, etc. containing hazardous materials or wastes.

Good Receiving and Delivery Procedures

Good receiving and delivery procedures will prevent acceptance of shipments which are off-spec, incorrect, or improperly packaged, and reduce unnecessary waste generation, returns, and spills.

Employee Training

Train receiving dock employees on proper handling of shipments to prevent property losses, waste disposal costs, and injuries.

Delivery Agreements

Use delivery agreements to limit your responsibility once you have delivered goods to a customer:

Require customers to inspect all deliveries.

Document that the materials have been received in an acceptable condition.

Obtain written copies of all delivery agreements to ensure that proper procedures are followed.

Purchasing Agreements

Review or create purchasing agreements:

Specify terms and conditions for receiving material orders.

Include provisions which allow you to inspect materials prior to acceptance. Address your responsibility in the event of a release. (Specify terms under which each party is responsible for clean-up or other expenses incurred to control an incident.)

Document agreements to ensure that specified procedures are followed. (Suppliers want your business and should be willing to ship on your terms. If not, try to find another supplier or change products.)

Customers

Request that your customers designate a specific area for receiving shipments which is designed to prevent and control accidents and releases.

Recommend that customers use only workers trained in hazardous materials handling.

Inventory Control

Control all incoming materials by:

Receiving them in a specific, designated area.

Designing the area to prevent / control spills.

Reliable Suppliers

Use quality suppliers, (quality and reliability are as important as cost):

Supplier should deliver goods intact and according to your specifications.

Check the track record of your supplier with other companies or references.

Inspection

Inspect shipments prior to acceptance:

Check for opened, damaged, or leaking containers.

Check expiration dates and ensure proper labeling.

Test for off-spec materials.

Obtain Material Safety Data Sheet (MSDS) if product is new.

Hazardous Materials and Waste Stream Segregation

Segregation practices can prevent accidents or emergencies, reduce waste disposal costs, and enhance recovery / recycling opportunities.

Segregation

Segregate raw and waste materials.

Segregate incompatible materials and wastes by hazard category to prevent reactions (e.g. strong acids and bases).

Place distinct wastestreams in separate containers and segregate containers holding different wastes.

Segregate hazardous from non-hazardous wastes. (Mixing non-hazardous waste with hazardous waste makes all of it become hazardous.)

Set up staffed collection centers to prevent unauthorized mixing of wastes.

Segregate empty containers by prior contents.

Return empty containers to the supplier. Some empty product containers can be returned to the supplier for refilling. (Containers and drums must meet the regulatory definition of "empty".) Use a supplier which offers this service.

Contract with a drum reconditioner or recondition onsite. Drums made of heavy gauge steel can be reconditioned. These cost more, but have a good recycling outlet for minimal or no cost. Don't accumulate for long periods to prevent possible deterioration.

Maintain drums in good condition (with all bungs, rings, and closures in place) for deposits to be refunded.

Reclaim scrap value onsite or contract with a metals recycler.